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Advancements in Sliding Vane Positive Displacement Pump Technology Leads to Greater Energy Savings

Bill Bohr, Blackmer

The latest design advancements in sliding vane positive displacement pump technology can reduce energy consumption and optimize performance.

In today's competitive marketplace, everyone-regardless of his business-is concerned about the bottom line. Energy costs worldwide continue to rise while companies demand improved profitability through greater cost controls. Consequently, reducing energy consumption is a key component in controlling costs. Higher energy costs impact every company's bottom line, particularly in the manufacturing sector where pumps represent 27 percent of the electricity used by industrial systems (according to the Hydraulic Institute's and the U.S. Department of Energy's Industrial Technologies Program Sourcebook for Industry).

No matter your business, it is clear that pumping systems are a major energy consumer, yet also vital necessity to every plant's operation. A wealth of advice and information on saving energy through proper pump selection and improved pumping systems is available through the Department of Energy's Industrial Technologies Program (ITP) and the Hydraulic Institute's Pump Systems Matter™ initiative (http://www.pumpsystemsmatter.org/). The energy-saving information and tips provided by the two institutions are easy to understand and cover both centrifugal and positive displacement pumps (PD).

For operations to significantly improve energy savings, they must take a "systems" approach, shifting the focus from the performance of individual components to that of the entire system. This approach enables operators to improve reliability, performance and efficiency of their overall pumping system. The results are not only greater energy savings, but also higher productivity, optimized performance and profitability. Utilizing the best technology (centrifugal or positive displacement)-properly sized with the appropriate piping design and control valve configurations-ensures the highest application efficiency.

Positive Displacement Pumps

Although the operating principles of PD and centrifugal pumps differ widely, they can be used to serve the same applications in many cases. In these instances, certain PD pumps may offer substantially improved processes and productivity as well as maintenance and energy cost savings. PD pumps generally require less NPSHA than centrifugal pumps, and may offer more flexibility relative to varying changes in pressure and flow requirements of continuous-type processes. PD pumps maintain higher efficiencies throughout the viscosity range, so a PD pump's high mechanical efficiency may offer improved energy savings over a centrifugal pump.

Not all PD pumps are created equal; there are significant differences between the various PD pump types, including internal gear, external gear, lobe, one screw, two screw, three screw, peristaltic and sliding vane pumps.

Sliding Vane Technology

In recent years, significant design advancements have given sliding vane technology a decisive advantage over other PD pump types, including optimized performance, low-shear capability, lowest life cycle cost and energy efficiency.

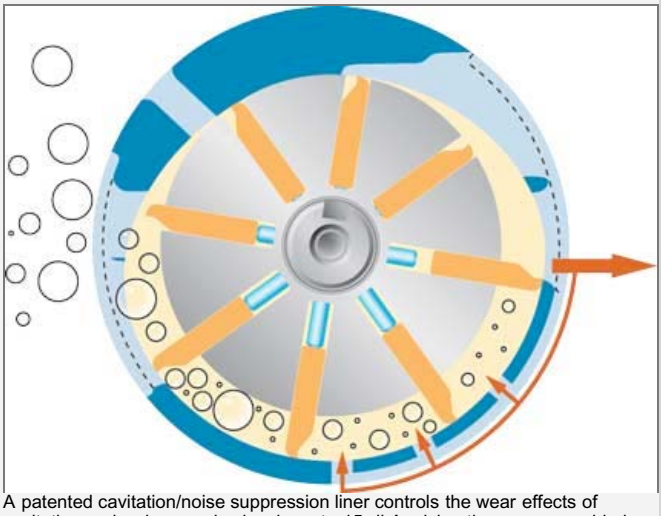
By design, sliding vane pumps operate with high volumetric efficiency and low slippage, allowing their use in applications at substantially lower viscosity than other positive displacement pump types can handle. With quieter operation, longer service life and reduced maintenance requirements, sliding vane technology may also result in significantly reduced energy consumption.

An important advantage of sliding vane pumps is the self-adjusting vanes that automatically slide out of slots in the rotor to continuously adjust for wear and maintain near-original efficiency and capacity throughout the life of the pump. Gear, lobe and screw-type pumps gradually diminish in efficiency as clearances increase due to the wear of the metal parts and cause increased "slip" and volumetric inconsistency. To compensate for the reduced performance, the pump speed should be increased, which not only further accelerates pump wear, but also increases energy consumption.

By eliminating the need to increase the pump speed over time, sliding vane pumps are inherent energy savers. To quote the Hydraulic Institute's "Testing for Pumping System Efficiency" Tip Sheet, "A pump's efficiency can degrade as much as 10 percent to 25 percent before it is replaced, according to a study of Industrial facilities commissioned by the U.S. Department of Energy (DOE), and efficiencies of 50 percent to 60 percent are quite common. However, because these inefficiencies are not readily apparent, opportunities to save energy by repairing or replacing components and optimizing systems are often overlooked." Self-adjusting sliding vane technology eliminates this energy-robbing problem.

One of the latest energy-saving innovations applied to sliding vane technology in recent years is the hydrodynamic journal bearing found on some motor speed vane pumps.

One of the most recent energy-saving innovations applied to sliding vane technology is the hydrodynamic journal bearing found on some motor speed vane pumps. The hydrodynamic journal bearing uses a unique fluid boundary forming principle that eliminates shaft-to-bearing contact. The shaft hydroplanes above the bearing surface on a cushion of liquid. In this hydrodynamic condition, there is no metal-to-metal contact or wear so bearing life is extended indefinitely. The pump maintains optimum bearing characteristics through a wide range of operating conditions. Reduced shaft/bearing contact minimizes friction and results in higher mechanical efficiency and smart energy cost savings.



A patented cavitation/noise suppression liner controls the wear effects of cavitation and reduces noise levels up to 15-dbA, giving the pump an added level of protection and extended service life.

Another notable innovation is the patented cavitation/noise suppression liner introduced several years ago. Cavitation can severely impact a pump's performance and efficiency as the liquid changes to a vapor inside the pump chamber. The flow decreases through the pump, and substantial damage to the pump can result as the vapor bubbles collapse back to the liquid state. This unique invention controls the wear effects of cavitation and reduces noise levels up to 15-dbA, giving the pump an added level of protection and extended service life. The liner is replaceable, so maintaining the pump in a new condition will help avoid efficiency loss.

Sliding vane technology is used worldwide to reduce energy costs and create a more efficient pumping system. This leading-edge technology solves seal, suction, product shear and volumetric efficiency problems and offers unique benefits like leak-free assurance, line stripping capabilities, metering and non-pulsating flow and energy savings.

The sliding vane principle offers efficiency at low flow rates and allows for higher operating speeds and pressures on low viscosity fluids compared to other types of positive displacement pumps. Capable of low flow, high head applications on low

viscosity fluids, today's sliding vane technology offers impressive advantages in the quest to reduce energy consumption without sacrificing performance. Low initial equipment costs, easy installation and maintenance and energy cost savings are just a few of the reasons to consider sliding vane pumps when evaluating your pumping systems.

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Bill Bohr is the director of product management at Blackmer, 1809 Century Avenue SW, Grand Rapids, MI 49503, 616-241-1611, bohr@blackmer.com, www.blackmer.com.